

## NEW LOCALITIES AND TAXONOMIC REMARKS FOR SOME MOSSES IN CONTINENTAL ANTARCTICA

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**Abstract:** Distribution and taxonomic aspects of four moss species occurring in Continental Antarctica are discussed. *Bryoerythrophyllum recurvirostre* (HEDW.) CHEN and *Pottia heimii* (HEDW.) HAMPE were found in several localities of Vestfold Hills, Princess Elizabeth Land. The former species was collected again 30 years after it was first collected at Vestfold Hills and the latter was recorded in the same area for the first time. *Pottia austro-georgica* CARD. was collected in Amundsen Bay, Enderby Land, which is the second record in Continental Antarctica. *Grimmia lawiana* J. H. WILLIS was newly collected on the Sør Rondane Mountains, Queen Maud Land. Distribution maps and illustrations of these species are given.

### 1. Introduction

Continental Antarctica has merely 20 or so bryophyte species in contrast with Maritime Antarctica which has more than 100 species. This is largely related to the different geographical and climatic features between the two regions. In Maritime Antarctica the character of the moss flora is affected by latitudinal changes, while in Continental Antarctica it alters according to longitudinal changes. Therefore, it is possible that other ice-free zones of Continental Antarctica have distinctive moss floras according to the site, more so than those of Maritime Antarctica.

According to SAVICZ-LJUBITZKAJA (1978), who compiled the bryological floras around the Russian stations of East Antarctica, five families, eight genera, eight species and four varieties were recorded during the ten years between 1956 and 1965. These included two new species and three new varieties. Significant in these records was an addition of a pleurocarpous moss, *Plagiothecium simonovii* L. SAV.-LJUB. et Z. SMIR., based on the material collected from Lake Sirmacher, Queen Maud Land. It was bryogeographically important that a hepatic, *Cephaloziella exilifolia* (TAYL.) DOUIN was found in Cape Hallet, northern Victoria Land and in Windmill Islands, Wilkes Land (STEERE, 1961; GREENE, 1967; SEPPELT, 1983). SEPPELT (1986) showed that four species in four genera (from three families) were distributed in Vestfold Hills, Princess Elizabeth Land.

In the Syowa Station area, which covers the east part of Queen Maud Land and the west of Enderby Land, seven moss species have been recorded, namely, *Ceratodon purpureus* (HEDW.) BRID., *Pottia austro-georgica* CARD., *P. heimii* (HEDW.) HAMPE, *Grimmia lawiana* J. H. WILLIS, *Bryum amblyodon* C. MUELL., *B. argenteum* HEDW., and *B. pseudotriquetrum* (HEDW.) GAERTN., MAYER et SCHERB. (HORIKAWA and ANDO, 1961; NAKANISHI, 1977; OCHI, 1979; KANDA, 1981, 1986; KANDA and OCHI,

1986; SEPPELT and KANDA, 1986).

The purpose of this article is to report new localities and to discuss the distribution and taxonomic aspects of four selected moss species occurring in Continental Antarctica, *Bryoerythrophyllum recurvirostre* (HEDW.) CHEN, *Pottia austro-georgica* CARD., *P. heimii* (HEDW.) HAMPE and *Grimmia lawiana* J. H. WILLIS.

All the specimens studied are housed in the herbarium of the National Institute of Polar Research, Tokyo (NIPR).

## 2. Results and Discussion

### 1) *Bryoerythrophyllum recurvirostre* (HEDW.) CHEN (Figs. 1, 2)

This moss was first reported by SAVICZ-LJUBITZKAJA and SMIRNOVA (1963a) from Bunger Hills as a new variety *antarcticum*. The Antarctic plant of this species was characterized by the occurrence of peculiar clavate hairs among young sexual organs. They considered that asexual reproduction in this species was attributed to those clavate hairs. SEPPELT (1986) reported this species from Vestfold Hills as the second record in Continental Antarctica based on a single specimen collected at Langneset (68°28'S, 78°19'E) by a member of the 1956/57 Soviet Antarctic Expedition. He then stated that the Antarctic specimens were considered to be only an

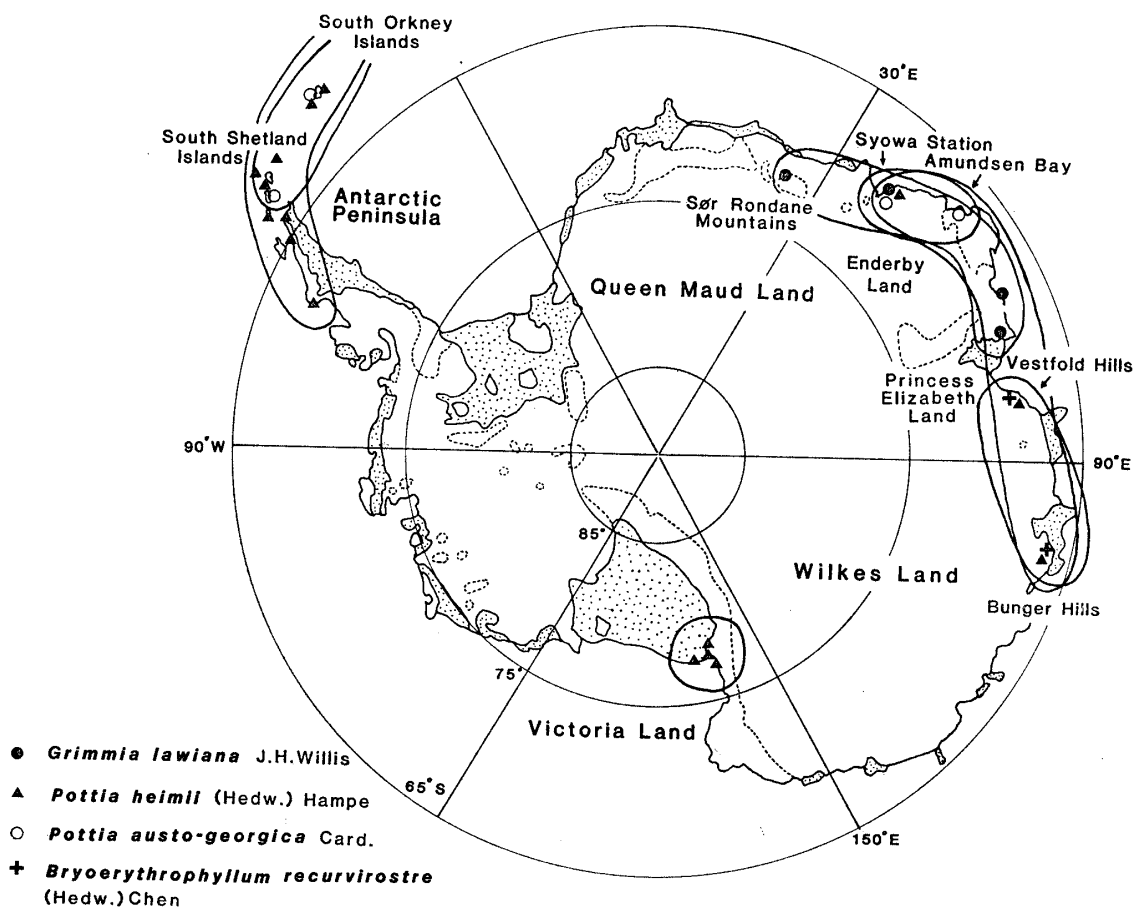


Fig. 1. Distribution patterns of the four moss species occurring in the Continental Antarctica.

ecotype and should be treated as synonymous with the typical species. I concur with his treatment.

I collected samples of this species at several localities in Vestfold Hills in January 1981, almost 30 years after it was first collected there. Its morphological features are shown in Fig. 2 based on one of my collections (KANDA 952).

The plants (5–20 mm tall) from Vestfold Hills are larger than the original specimens (2–8 mm tall) from Bunger Hills. All the material is sterile and resembles *Ceratodon purpureus*. The peculiar clavate hairs described by SAVICZ-LJUBITZKAJA and SMIRNOVA (1963) were not confirmed in these specimens. It was instead observed that the leaf-apex was physically damaged and often lacking. This feature seems to be a useful means of vegetative reproduction. The plants were growing on calcareous sandy soil along the shore of a lake, and were often associated with *Pottia heimii* (HEDW.) HAMPE and *Sarconeurum glaciale* (C. MUELL.) CARD. et BRYHN.

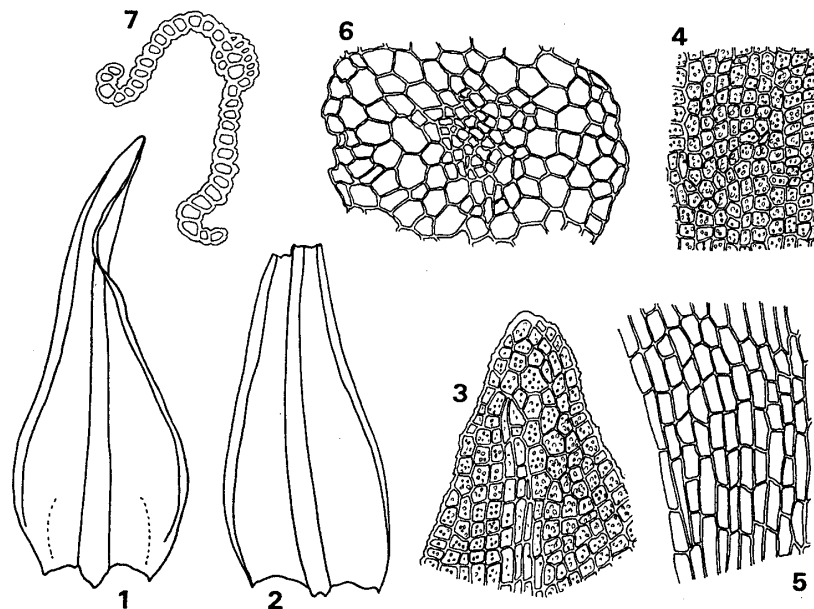


Fig. 2. *Bryoerythrophyllum recurvirostre* (HEDW.) CHEN. 1, 2: Stem leaves, 3: Leaf apex, 4: Median laminal cells, 5: Basal cells of leaf, 6: Cross-section of stem, 7: Cross-section of leaf. 1, 2:  $\times 27$ , 3–7:  $\times 100$ . Drawn from KANDA 952.

Specimens examined: Princess Elizabeth Land. Vestfold Hills. Learner's way, 15 m alt., KANDA 945, 951, 952, 953, 955, 956, 958; 20 m alt., KANDA 959. Depot, 5 km N of Mossy Hut, 20 m alt., KANDA 981, 992, 995, 996, 998. Mossy Hut, 1 m alt., KANDA 1001, 1002, 1003, 1005, 1006, 1007; 10 m alt., KANDA 1012, 1014, 1016, 1020, 1021. Trager Valley, 100 m alt., KANDA 1030.

## 2) *Pottia austro-georgica* CARD. (Figs. 1, 3)

This species was first described by CARDOT (1906) from Royal Bay, Moltke Harbour, South Georgia. MATTERI (1977) reported it from the South Georgia, South Sandwich Islands and South Orkney Islands. In addition to these reports, I (KANDA, 1981) recorded it from King George Island, South Shetland Islands and the Syowa Station area, Enderby Land. I then pointed out that the distribution of this

species was extremely disjunctive in the Antarctic Peninsula including its neighboring islands and the Syowa Station area.

I here report it further from Richardson Lake, Amundsen Bay, Enderby Land, which is located about 500 km east of Syowa Station. This is the second record in Continental Antarctica. An illustration is given in Fig. 3 based on this material (KANDA 554).

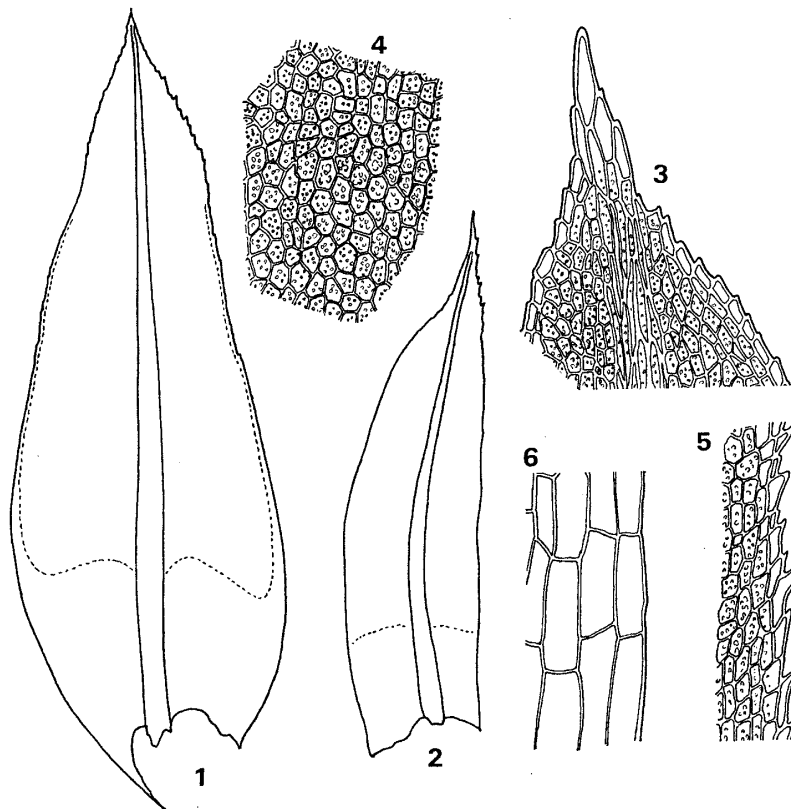


Fig. 3. *Pottia austro-georgica* CARD. 1, 2: Stem leaves, 3: Leaf apex, 4: Median laminal cells, 5: Marginal cells of leaf, 6: Basal cells of leaf. 1, 2:  $\times 27$ . 3-6:  $\times 100$ . Drawn from KANDA 554.

Almost all of the gametophytic features of the specimen from the Amundsen Bay area correspond to those from the Syowa specimens, but the leaf size is larger in the former specimen (1.5–2.0 mm long) than in the latter (about 1.3 mm long). A specimen collected in Amundsen Bay in February 1982 bears young sporophytes which have the following features: seta yellowish-brown, 5–7 mm long; capsule reddish-brown, erect, short-cylindrical, 1.8–2.0 mm long; lid rostrate, disconnected from the columella of the capsule. This is the first record of fruiting specimens in Continental Antarctica. The plants from Amundsen Bay were usually associated with *Bryum pseudotriquetrum* (HEDW.) GAERTN., MAYER et SCHERB., and *Ceratodon purpureus* (HEDW.) BRID.

Specimen examined: Enderby Land, Amundsen Bay, Richardson Lake, Y. INO (KANDA 554).

3) *Pottia heimii* (HEWD.) HAMPE (Figs. 1, 4)

Some gametophytic features of Antarctic specimens of this species such as cell shape and smooth cells in the middle part of the leaf closely resemble those of the genus *Bryum* in microscopic detail. It has thus been known as *Bryum antarcticum* HOOK. f. et WILS. NAKANISHI (1977) reported good specimens of *Bryum antarcticum* with matured sporophytes which were distinctive in having erect capsules without peristome teeth and lids disconnected from the columella of the capsule, characters which are clearly not those of *Bryum*. Since the Syowa specimen conforms well with the type specimen (Cockburn Is., HOOKER f.) of *B. antarcticum* and the chromosome number of the Syowa specimen is known to be  $n=26+2$  acc. (INOUE, 1976), *B. antarcticum* can appropriately be included in the Pottiaceae, and is specifically identified as *Pottia heimii* (KANDA, 1981). However, a further study may be necessary to interpret variation in the degree of cell papillosity in comparison with specimens of *P. heimii* distributed in Maritime Antarctica and Arctic regions. It is still important to compare it with *Pottia heimii* var. *brevinervis*, which was described by SAVICZ-LJUBITZKAJA and SMIRNOVA (1963b) as a new variety from Bunker Hills. This variety was reduced to a synonym of the typical form by KANDA (1981), but compared with other Antarctic specimens the leaf cells possess better-developed papillae, the leaves are smaller in size and not so acuminate toward the leaf apex and the costa usually vanishes in the leaf apex. Most specimens previously reported as *Bryum antarcticum* have probably been confused with the *Bryum pseudotriquetrum* complex, and it is impossible to obtain an accurate distribution pattern of this species based on formerly published literature records.

This species was collected by me from Vestfold Hills in January 1981. It is illustrated in Fig. 4 based on this material (KANDA 960).

Almost all vegetative features of this material are the same as those in the Syowa

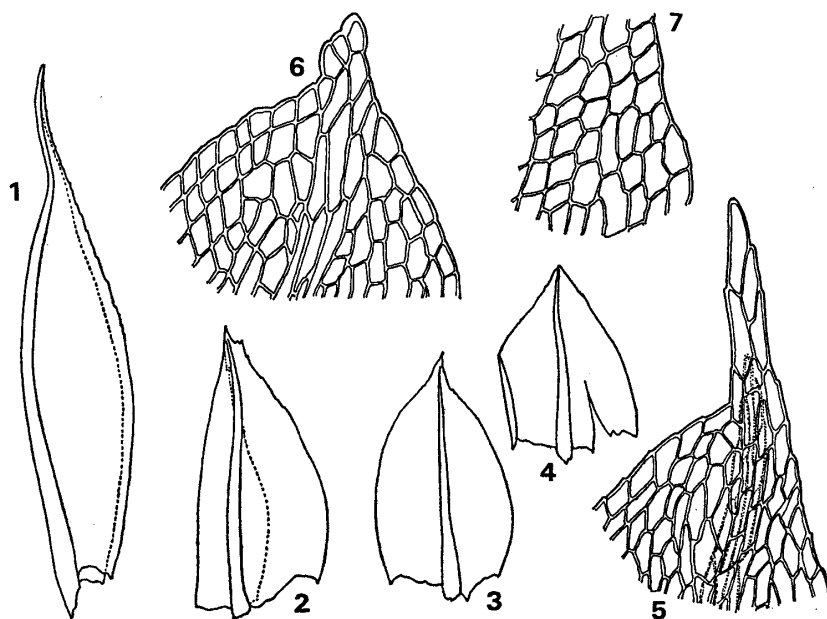


Fig. 4. *Pottia heimii* (HEDW.) HAMPE. 1-4: Stem leaves, 5, 6: Leaf apex, 7: Median and marginal laminal cells of leaf. 1-4:  $\times 27$ , 5-7:  $\times 100$ . Drawn from KANDA 960.

specimens. There were no papillae on median leaf cells in any of the specimens. This species was usually associated with *Sarconeurum glaciale*, *Bryoerythrophyllum recurvirostre* and *Bryum pseudotriquetrum* in the field. SEPPELT (1986) did not mention this species in his study of the moss flora of Vestfold Hills. The species has so far been examined by me in Continental Antarctica from McMurdo Sound, Victoria Land; Syowa Station area, Enderby Land; Vestfold Hills, Princess Elizabeth Land and Bunger Hills, Wilkes Land.

Specimens examined: Princess Elizabeth Land. Vestfold Hills, Learner's way, ca. 20 m alt., KANDA 960, 961, 962, 965, 966. Depot, 5 km N of Mossy Hut, ca. 20 m alt., KANDA 977, 979, 991, 997. Mossy Hut, ca. 10 m alt., KANDA 999, 1000.

4) *Grimmia lawiana* J. H. WILLIS (Figs. 1, 5)

This species was first described from Ring Rocks, Mac.Robertson Land (WILLS in FILSON, 1966). It was later reported from Enderby Land (NAKANISHI, 1977; KANDA, 1981, 1986), southern Prince Charles Mountain and Mac.Robertson Land (SEPPELT and ASHTON, 1978). BELL (1984) studied the *Grimmia* and *Schistidium* of South Georgia, but he made no mention of this species. The species is thus regarded at present as an endemic species to Antarctica.

*Grimmia lawiana* was collected by a member of the Japanese Antarctic Research Expedition at Otto Borchgrevink fjellet and Tanngarden of Sør Rondane Mountains, eastern Queen Maud Land in January 1985. Its morphological features are shown in Fig. 5 based on this material (KANDA 1202). This species was compared with *Grimmia fastigiata* CARD. which was described from Tierra del Fuego (Type: Ushuaia, SKOTTSBERG 70) and later reported from Bunger Hills, Wilkes Land. The two species resemble each other in the shape of leaves which have a long awn at apex, but *G.*

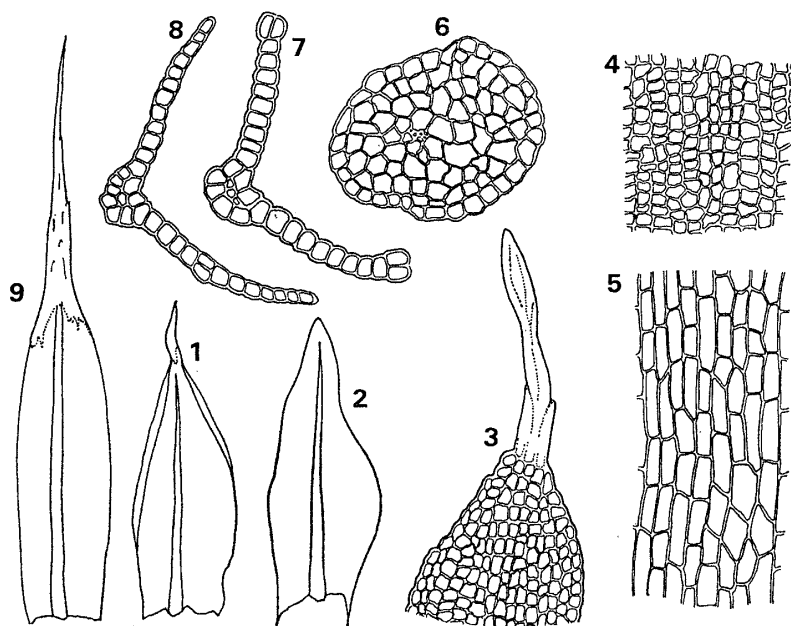


Fig. 5. *Grimmia lawiana* J. H. WILLIS. 1, 2: Stem leaves, 3: Leaf apex, 4: Median cells of leaf, 5: Basal cells of leaf, 6: Cross-section of stem, 7, 8: Cross-sections of leaf, 9: Inner perichaetial leaf. 1, 2, 9:  $\times 27$ , 3-8:  $\times 100$ . Drawn from KANDA 1202.

*fastigiata* has larger leaves with recurved margins and more incrassate, strongly sinuous cell-walls. SEPPELT (1986) suggested that *Grimmia trichophylla* GREV. and *G. nordenskioldii* CARD. might be confused with *G. lawiana* by having small and narrow leaves whose margins are, in cross-section, thickened into 2–3 cell-layers. However, *G. trichophylla* (Type: not seen) is distinct from *G. lawiana* by the more thickened and sinuous cell-walls of the leaves. *G. nordenskioldii* (Type: South Georgia, SKOTTSBERG 306), which has been reduced to a synonym of *G. immerso-leucophaea* (C. MUELL.) KINDB. by BELL (1984) differs from *G. lawiana* in having more incrassate and narrower cells at the leaf base and more sinuous cell-walls at the middle part of the leaf.

*G. lawiana* also resembles *G. plagiopodia* HEDW. var. *antarctica* BARTR. (Type: Mary Byrd Land, Mt. Marujupu, BARTRAM B 37.1) in its rounded quadrate leaf cells, but the narrower and smaller leaves of the former species are distinct from the ovate-lanceolate leaves of the latter species which are rounded, obtuse, or short-apiculate.

In the Sør Rondane Mountains, *Grimmia lawiana* usually grows around the rookeries of snow petrels (*Pagodroma nivea*). No other mosses were observed to be associated with this species. In contrast, in the Syowa Station area, its habitats and ecological aspects are variable. They occur not only at drier sites around the glacial area, but also in and along the streams and are distributed in the coastal sites where the glaciers in the ice-free area are considered to have retreated during relatively recent times (KANDA, 1986).

Specimens examined. Queen Maud Land. Sør Rondane Mountains, 10 km NW of Otto Borchgrevink fjellet, M. SANO (KANDA 1214). Tanngarden, M. SANO (KANDA 1202, 1203).

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